CHAPTER 1. AIR NAVIGATION AND COMMUNICATIONS

SECTION 5. SPECIAL NAVIGATION AREAS OF OPERATION

201. GENERAL. Special navigation areas of operation are geographic areas having unique characteristics which require the use of special equipment, procedures, and/or techniques to safely conduct flight operations. These special areas also include operational situations when the application of standard criteria is unnecessarily restrictive and other than standard criteria are more appropriate and can be safely used. This section provides direction and guidance for the evaluation and approval or denial of an operator's request to conduct operations in these special navigation areas of operation. Special navigation areas of operation include the following:

- Areas requiring high levels of long-range navigation performance (high navigation precision) due to traffic density
- Areas where navigation by magnetic reference is unreliable and/or inappropriate
- Areas where metric altitudes/flight levels are used (altitudes in meters)
- Areas where communication difficulties are frequently encountered
- Areas where air traffic control difficulties are frequently encountered
- Areas where operations by U.S. operators have political or international sensitivity
- Areas where aircraft with unique performance characteristics require special criteria
- Areas where Class II navigation using International Civil Aviation Organization (ICAO) standard navigational aids (NAVAID) supplemented by dead reckoning can be conducted with domestic separation minimums (Atlantic and Gulf routes)
- Areas where redundant long-range navigation systems are not normally required

NOTE: The geopolitical area formerly known as the Soviet Union is now comprised of the Commonwealth of Independent States (C.I.S.) and other independent states. This group of aligned and independent states will be referred to as the C.I.S. throughout this volume.

203. AREAS REQUIRING HIGH LEVELS OF LONG-RANGE NAVIGATION PERFORMANCE. In certain special navigation areas of operation, the air traffic control (ATC) system must be designed to operate more efficiently due to the density of the air traffic. This requires levels of navigation performance higher than the normal long-range navigation standards. Significant increases in air traffic over certain busy routes, such as the North Atlantic, can be accommodated efficiently if the ATC separation minimums are reduced to permit more aircraft to fly along or as close as possible to the minimum cost routings. This reduction in separation minimums, however, can only be safely accomplished through significant improvements in ATC capabilities and the navigation performance of all aircraft operating within that route structure.

A. The options currently available to permit reductions in ATC separation minimums include use of the following:

- Independent surveillance (ATC radar)
- Dependent surveillance (data link of the aircraft's present position to the ATC system)
- Reduced lateral separation minimums
- Reduced vertical separation minimums
- Reduced longitudinal separation minimums
- A combination of reduced lateral and reduced vertical separation minimums (composite separation)

B. With the exception of independent and/or dependent ATC surveillance, the safe implementation of any of these options requires improvements in navigational performance. It is important to remember that a navigation performance standard includes all causes of navigation error. The causes are not equipment accuracy standards alone. Navigation performance standard includes consideration for flight technical errors. (see paragraph 9) Paragraphs 205, 207, and 209 discuss three types of special navigation areas of operation which require high levels of long-range navigation performance.

205. NORTH ATLANTIC MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS AIRSPACE (NAT/MNPS).

A. The NAT/MNPS as implemented in the ICAO North Atlantic Region is an extremely demanding standard. Safety of flight in this airspace is critically dependent of each operator achieving and continuously maintaining these high levels of overall navigation performance. Figure 4.1.5.1. depicts the rectangular separation as it is currently applied in NAT/MNPS airspace. This standard (implemented by FAR Part 91, Appendix C) requires each U.S. operator to acquire Federal Aviation Administration (FAA) approval before conducting any operation in NAT/MNPS airspace. The operator must obtain this approval for each airplane and navigation-system combination used for operations in this airspace. To obtain NAT/MNPS approval, the operator must show compliance with the following conditions:

- Each aircraft is suitably equipped and capable of meeting the MNPS standards
- Operating procedures are established which assure MNPS standards are met
- The flightcrews are capable of operating with sufficient precision to consistently meet MNPS requirements

B. The NAT/MNPS represents navigational performance (necessary to reduce the risk of collision) on a internationally established level. The MNPS establishes the following four demanding criteria:

(1) The average lateral deviation (for any cause) cannot be greater than 6.3 nautical miles (NM) from the exact centerline of the assigned route over any portion of the route.

(2) Ninety-five percent of all of the lateral displacements (for any cause) from the exact centerline of the assigned route cannot be greater than 12.6 NM for all flights over any portion of that route.

(3) Each operator cannot have more than 1 lateral deviation (for any cause) of 30 NM or more in 1,887 flights in the NAT/MNPS airspace. When errors of these magnitudes occur the aircraft has failed to navigate to the degree of accuracy required for the control of air traffic.

(4) Each operator cannot have more than 1 lateral deviation (for any cause) which is within ±10 NM of a multiple of the separation minimums applied in 7,693 flights in the NAT/MNPS airspace. NAT/MNPS airspace routes are separated by 60 NM. Multiples of 60 are 60, 120, 180, etc. Therefore, ±10 NM of these multiples are 50-70 NM, 110-130 NM, 170-190 NM, etc. For example, if an error of 50-70 NM occurs, the aircraft has blundered into the airspace of an adjacent route. Errors of these magnitudes are extremely serious. The potential for a collision is high because the resulting flightpath can overlap the flightpath assigned to another aircraft (possibly coming from the opposite direction).

NOTE: Operational history in NAT/MNPS airspace clearly shows that most serious navigation errors are directly related to operator/pilot error. Equipment malfunction and equipment accuracy are usually not the primary cause for these errors. Most of these serious errors are caused by the flightcrew navigating precisely to the wrong place while believing they know the actual position of the aircraft.

C. *Initial NAT/MNPS Approvals.* Each operator and each aircraft and navigation system combination must be approved before operating in NAT/MNPS airspace. Each operator must demonstrate (validate) that it can meet MNPS standards before receiving approval. Sufficient accuracy data must be collected during this demonstration to show that navigation performance meets MNPS standards.

(1) All data collection flights necessary to validate navigational performance must be conducted outside (or above or below) NAT/MNPS airspace unless additional systems (currently meeting the MNPS) are installed and used as the primary means of navigation.

(2) Inspectors must assure that requirements of Advisory Circular (AC) 120-33 (or equivalent) are fully met by the operator before approving any operation in this airspace. All NAT/MNPS approvals are granted by issuing paragraph B39 and by adding that area of en route operation to paragraph to paragraph B50 of the standard operations specifications.

D. *Maintaining NAT/MNPS Authorization.*

(1) In addition to initially meeting MNPS criteria, each operator must continuously maintain the required level of navigational performance. Each gross navigational error (errors greater than 25 NM) has a significant impact on flight safety in this airspace and must be fully investigated in a timely manner. The cause of each error must be identified and meaningful action must be taken to prevent reoccurrence of similar errors.

(2) When a particular operator (for any cause) experiences a gross navigation error rate higher than the internationally established error rate permitted in MNPS airspace, the responsible inspector must immediately notify the operator that timely action must be taken to improve navigation performance. After this

notification, inspectors must determine the effectiveness of the operator's actions as follows:

(a) If it is determined that an operator's actions will prevent the occurrence of similar errors, the operator should be permitted to continue NAT/MNPS operations with close surveillance of the operator's navigational performance. If similar errors occur (in subsequent operations) more frequently than permitted by the standard, stronger action must be taken.

(b) If an operator fails to take action to improve navigation performance, action must be initiated to suspend NAT/MNPS authorization (operations specifications).

(c) If it is determined that an operator's actions to improve navigational performance are inadequate or otherwise unsatisfactory, the operator must be notified that the corrective action is unacceptable. When an operator does not implement a satisfactory solution, the action must be initiated to suspend NAT/MNPS authorization.

NOTE: It is FAA direction and guidance that one of the agency's navigation specialists must participate in the investigation of gross navigation errors. These specialists must also participate in the evaluation of the actions proposed by the operator to preclude the occurrence of similar errors. AFS-200 must be notified as soon as possible when an inspector and/or a navigation specialist determines that actions should be taken to suspend NAT/MNPS authorization.

207. CANADIAN MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS AIRSPACE. Certain high altitude airspace in Northern Canada has been designated as Minimum Navigation Performance Specification (MNPS) airspace (see Canadian Aeronautical Information Publication (AIP)). The navigational performance criteria for operation in Canadian MNPS airspace is identical to the criteria for NAT/MNPS airspace.

A. *General Criteria.* Any aircraft/navigation system combination approved for unrestricted operation in NAT/MNPS airspace, for a particular operator, also meets Canadian MNPS criteria. A particular operator can (under most circumstances) be authorized (without recertification under AC 120-33) to conduct Canadian MNPS operations with those aircraft and navigation system combinations authorized for that operator in NAT/MNPS airspace. However, due to the unique nature of operations in high latitudes and in areas of magnetic unreliability, approval for Canadian MNPS operation is not automatic. Each proposed operation must be evaluated on its own merits.

B. *Special Factors.* The following special factors must be considered and carefully evaluated before granting air navigation approvals for operation in Canadian MNPS airspace.

(1) For operators currently authorized to use an aircraft and an Inertial Navigation System (INS) combination in NAT/MNPS airspace the following factors apply:

(a) INS systems meeting NAT/MNPS criteria automatically meet Canadian MNPS criteria.

(b) Operations at high latitude airports (greater than 67°N/S) must not be authorized unless INS platform alignment has been successfully demonstrated or approved for those latitudes.

(c) Training programs and crew procedures must provide techniques and methods for the following:

- Approaches and departures using appropriate heading references other than magnetic
- Use of ground-based NAVAID's oriented to appropriate directional references other than magnetic

(2) For operators currently authorized to use an aircraft and an Omega navigation system combination in NAT/MNPS airspace the following factors apply:

(a) The operator must show that adequate signal coverage exists within Canadian MNPS airspace to reliably meet AC 120-33 and AC 120-37 criteria.

(b) Omega installations which provide, in Canadian MNPS airspace, signal coverage and signal figure-of-merit values equivalent to those approved for that aircraft and navigation system combination in NAT/MNPS airspace may be approved for Canadian MNPS operations, provided the system is certified as airworthy for this area using heading reference systems other than magnetic.

(c) Training programs and crew procedures must provide acceptable techniques and methods for the following:

- Accurate and reliable en route navigation using heading references other than magnetic
- Approaches and departures using appropriate heading references other than magnetic

- Use of ground-based NAVAID's which are oriented to appropriate directional references other than magnetic

NOTE: It is FAA direction and guidance that one of the agency's navigation specialist must participate in the evaluation and approval or denial of proposals to use any Omega or Omega/VLF system for operations in Canadian MNPS airspace.

(3) For operators who are not currently authorized to use an aircraft and a navigation system combination in NAT/MNPS airspace, but propose to operate in the Canadian MNPS airspace, the following direction applies:

(a) The operator must meet the criteria in AC 120-33 (or equivalent) considering the conditions unique to Canadian MNPS airspace.

(b) The operator must also meet the special factors specified in B(1) and/or (2), as appropriate.

(c) All Canadian MNPS airspace approvals are granted by adding that area of en route operations to paragraph B50 of the operations specifications.

209. OPERATIONS IN AIRSPACE WHERE COMPOSITE SEPARATION IS APPLIED BY ATC.

Special long-range navigation performance requirements are necessary in certain areas of the Eastern and Northern Pacific Ocean where composite separation has been applied (through international agreement) by ATC. There are two areas where composite separation is currently applied. They are the Central East Pacific (CEPAC) composite airspace and North Pacific (NOPAC) composite airspace. Operations in these areas must be conducted in accordance with paragraphs B37 and B38 of the standard operations specifications. The application of composite separation involves the use of a composite of lateral and vertical separation minimums to provide safe separation of aircraft and permit more flight tracks closer to the optimum minimum cost routing.

A. *Concept.* The application of composite separation permits the use of flight levels (FL) not normally available for high altitude flight (FL 320, FL 340, FL 360, FL 380). A pictorial comparison between composite separation minimums and normal oceanic separation minimums is provided in figure 4.1.5.2. When composite separation is used the following separation minimums currently apply:

(1) Co-altitude aircraft are still separated laterally by the standard minimums (100 NM).

(2) Aircraft assigned to the same flight track are still separated vertically by the standard minimums (2000 feet).

(3) Additional flight tracks, however, are sandwiched in between. These flight paths are separated from the adjacent flight paths by a composite of lateral separation (50 NM) and vertical separation (1000 feet).

(4) Aircraft assigned to the same flight track and altitude are separated longitudinally by 15 minutes.

NOTE: Separation minimums may change with technological advances and/or enhanced ATC practices and procedures. See ICAO Document 7030 (Regional Supplementary Procedures) for current separation minimums applied in each ICAO region.

B. *Navigational Performance.* This unique route structure requires navigational performance better than the basic oceanic standard due to the closer proximity of aircraft on adjacent flight tracks. This higher level of required navigational performance is not compatible with operations based on the use of a flight navigator and aids such as celestial, pressure pattern, and dead reckoning. Pilot-operated electronic long-range navigation systems such as INS and Omega or Doppler updated by Omega are currently the primary means of providing the required performance. Operating procedures such as those specified in AC 90-79 (or equivalent) are also necessary to consistently attain and maintain the necessary levels of navigational performance in composite airspace.

C. *Additional Requirements for Operations in the North Pacific.* Certain North Pacific (NOPAC) routes bordering C.I.S Airspace require additional navigational equipment and operational procedures. Operations on the NOPAC fixed routes require airborne radar suitable for ground mapping to monitor navigational performance, detect significant navigational errors, and avoid unauthorized overflight of C.I.S territory. The airborne radar must be operational for all flights over these routes and must be continuously used by the flightcrew to monitor flight progress over these routes.

D. *Approvals.* All CEPAC composite airspace approvals are granted by issuing paragraph B37 and by adding that area of en route operation to paragraph B50 of the standard operations specifications. Approvals for any operations into the NOPAC airspace including the composite airspace of that area are granted by issuing paragraph B38 and by adding that area of en route operation to paragraph B50 of the standard operations specifications.

211. AREAS OF MAGNETIC UNRELIABILITY. Two large areas of en route operation have unique features which significantly

complicate air navigation. These two areas are centered around the earth's magnetic poles.

A. *Concept.* Conventional magnetic compasses sense magnetic direction by detecting the horizontal component of the earth's magnetic field. Since this horizontal component vanishes near the magnetic poles, magnetic compasses are highly unreliable and unusable in an area approximately 1000 NM from each magnetic pole. Within these areas, air navigation tasks are further complicated by very rapid changes in magnetic variation over small distances. For example, when flying between the magnetic North Pole and the true North Pole, a heading of true North results in a magnetic heading of South (a magnetic variation of 180 degrees).

B. *Convergence of the Meridians.* Since these two major areas of magnetic unreliability also occur near the earth's geographic poles, the convergence of the meridians also presents additional directional complications. When flying "great circle" courses at latitudes greater than 67 degrees, convergence of the meridians can create rapid changes in true headings and true courses with small changes in aircraft position. As a result, relatively small errors in determining the aircraft's actual position can produce very large errors in determining the proper heading to fly to maintain the assigned flight path. When even small errors occur, very large navigation errors can develop over extremely short distances. An extreme example of this phenomena occurs at the earth's geographic North Pole. Flight in any direction from the exact pole is initially due South (that is, the direction to the C.I.S or the U.S. is South).

C. *Special Equipment, Techniques, and/or Procedures.* Special navigation equipment, techniques, and/or procedures are critical to operate safely in polar areas, including the two areas of magnetic unreliability. Operations based solely on magnetic references within areas of magnetic unreliability are unsafe, unacceptable, and shall not be approved. Operations within these areas can only be conducted safely if the primary heading reference is derived from sources other than magnetic.

(1) All INS's are capable of calculating true North independently from other aircraft systems. INS can be approved and safely used for operations in areas of magnetic unreliability and polar areas provided the following conditions are met:

(a) The INS is certified as airworthy for the highest latitude authorized for these operations.

(b) Ground alignment of the INS is restricted to those airports where satisfactory alignment has been demonstrated or otherwise approved.

(c) The operator's training programs and crew procedures provide acceptable techniques and methods for the following:

- Approaches and departures using appropriate heading references other than magnetic
- The use of ground-based NAVAID's which are oriented to appropriate directional references other than magnetic

(2) All current Omega and Omega/VLF systems require reliable heading information to provide useful navigational guidance. As a result, all Omega systems must use an appropriate heading reference system, other than magnetic, when operating within these areas. The current means of providing the required heading reference is through the use of "free gyro" or "grid" equipment, procedures and techniques. The gyros (compasses) necessary for these operations require special calibration, special compensation techniques, and unusual operational procedures. The special skills required to operate these systems are critical to safety of flight.

NOTE: It is FAA direction and guidance that inspectors shall not approve operations in polar areas and/or areas of magnetic unreliability using navigation systems other than INS without the participation and concurrence of one of the agency's navigation specialists.

(3) There is a wide variety of other methods, system, techniques, and procedures (including pilotage operations) which can be used for navigation in areas of magnetic unreliability and polar areas. However, due to the variety of means and the complexity of air navigation in these areas, specific direction and guidance for these other means of navigation are not provided in this handbook.

NOTE: It is FAA direction and guidance that inspectors shall request assistance from one of the agency's navigation specialists in evaluating and approving or denying an operator's request to use systems, techniques, or procedures which are not discussed in this section.

D. *Boundaries of the Area of Magnetic Unreliability.*

(1) For the northern hemisphere, the Canadian AIP establishes the basic boundaries for the area of magnetic unreliability. Canadian Air Navigation Order, Series V, No. 22 states in paragraph 4 that no person may operate an aircraft in IFR flight within Canadian northern domestic airspace unless it is equipped with a means of establishing direction which is not dependent on a magnetic source. The special

equipment, training, and procedures discussed in this paragraph are required for all operations into the area of northern domestic airspace. The boundaries of this area are shown in figure 4.1.5.3. This area is also outlined on Canadian en route charts. For the purposes of this paragraph, northern domestic airspace is considered to extend from ground level to infinity.

(2) For the southern hemisphere, any operation south of 65 degrees south latitude is considered to be within the area of magnetic unreliability. Any proposal to operate within the area of magnetic unreliability in the southern hemisphere must be reviewed and concurred with by AFS-200 before approval.

E. *Approvals.* All approvals for operations into areas of magnetic unreliability are granted by issuing paragraph B40 and by adding that area of en route operation to paragraph B50 of the standard operations specifications.

213. AREAS WITH SIGNIFICANT COMMUNICATIONS AND/OR AIR TRAFFIC CONTROL DIFFICULTIES. The levels of sophistication in communication, navigation, and air traffic control capabilities in certain areas of operation outside North America and Europe vary widely. The following subparagraphs provide general information about these areas and paragraph 155 provides evaluation criteria that must be considered when approving operations in these areas.

A. *NAVAID's.* The ground-based facilities which are implemented to support air navigation in some of these areas are based on antiquated technology and frequently experience reliability problems. The national airspace system and the navigational performance requirements in many countries are based almost exclusively on NDB's. Also, many of the NAVAID's do not operate continuously. For example, NAVAID's are shut down from dusk to dawn in certain countries.

B. *Communication.* The primary means of en route communication with ATC in many areas of operation is almost exclusively High Frequency (HF) radio. Atmospheric noise created by extensive thunderstorm activity in tropical areas significantly increases the difficulty of using HF as a prime means of communication with ATC. In some of these areas it is necessary to use "CALLSEL" (the reverse of SELCAL) to establish contact with HF ground stations.

C. *ATC.* The level of air traffic service varies from radar based services (equivalent to domestic U.S. operations) to a total absence of any ATC. Flight Information Regions (FIR) have been established in most areas of the world. Specific ICAO member states have been assigned the responsibility of providing air traffic services in these FIR's. Except for certain technically advanced countries, however, the degree of implementation of advanced ATC capabilities is very low. En route ATC radar is not available in most countries and air traffic services are based on position reports and airborne navigation performance capabilities. Various levels of air traffic services provided in these areas are as follows:

(1) *Controlled Airspace.* Within controlled airspace, ATC provides air traffic control service to prevent collisions between aircraft and to expedite and maintain an orderly flow of air traffic. This also includes air traffic advisory services and those alerting services related to weather and search and rescue.

(2) *Advisory Airspace.* Within advisory airspace, air traffic advisory service is available to provide separation, to the extent possible, between aircraft operating on IFR flight plans. It is important to understand that this is an advisory service (similar to an flight service station (FSS)), not a control service (prevention of collision). In advisory airspace, flightcrews are provided information concerning the location of other aircraft. Prevention of collision is the responsibility of the pilot-in-command (PIC). The air traffic services available also include those alerting services related to search and rescue. In certain areas, special reporting procedures called "broadcasts in the blind" have been established to assist pilots in avoiding other aircraft. At designated intervals, each pilot broadcasts the aircraft's position, route, and flight level over a specified VHF frequency. Awareness of the proximity of other aircraft is obtained by maintaining a continuous listening watch on the specified frequency. This procedure is an "expected" practice in large portions of Northwestern Africa (including most Brazilian airspace). In many of these areas the "broadcast-in-the-blind" procedure is the only means of separating IFR aircraft, other than see-and-avoid.

(3) *No-Man's-Land.* Flight information regions have not been established for a few areas in the world. The largest of these areas is in the South Atlantic Ocean annotated as "No FIR." Flight information service also do not exist in the high altitude structure in other large areas (above the top of controlled airspace). Within no-man's-land, aircraft separation (prevention of collision) is entirely the responsibility of the PIC. Advice and information for the safe and efficient conduct of flights is not provided from an air traffic service unit. Alerting services related to search and rescue are not provided by an air traffic service unit.

D. *Metric Flight Levels.* The national airspace systems in most Eastern European and Asian Communist Bloc countries are based on the use of metric flight altitudes/levels. Operations within these areas require special procedures to translate the metric flight levels to usable flight levels. For example, a flight level of 10,000 meters represents FL 328 or a flight altitude of 1,000 meters represents an altitude of 3,280 feet.

215. EVALUATION CRITERIA FOR AREAS WITH COMMUNICATIONS AND ATC DIFFICULTIES.

All proposals to conduct operations in the sovereign airspace of countries outside of North America, Western Europe, Japan, the Philippines, and the countries associated with the British Commonwealth, must be evaluated on a case-by-case basis.

A. *General Criteria.* The operator must show (considering factors unique to the proposed area of operation) that safe operations can be conducted within the area of operation and that the facilities and services necessary to conduct the operation are available and serviceable during the period when their use is required. The operator must also show that the proposed operations is in full compliance with the requirements in Part B of the operations specifications which are applicable to that operation.

B. *Operations in Advisory Airspace.* The operator must show that its training programs and operating procedures permit safe operations in advisory airspace and assure compliance with the "expected" operating practices. The operator must also show that the operation is in compliance with paragraph A14 of the operations specifications.

C. *Operations in No-Man's Land.* Since air traffic control, air traffic advisory, flight information, and alerting services are not available from air traffic service units when operating within these areas, the operator must show that acceptable, alternative means are available to assure the following:

(1) The appropriate organization can be notified in a timely manner when search and rescue aid is needed

(2) Changes in significant weather information can be provided to the flightcrew in a timely manner

(3) Changes in the serviceability of the required navigation aids are available to the flightcrew and the operator's operational control system

(4) Reliable information concerning other IFR aircraft operating within this area is available inflight. This includes "broadcast in the blind" procedures and other "expected" practices

(5) The required navigation facilities necessary to safely conduct the operation are available and serviceable

D. *Role of Navigation Specialists.* The uniqueness of operations in advisory airspace and in no-man's land usually requires assistance from persons with special navigational knowledge, skills, and expertise. Several navigation specialists are available in the FAA for these purposes. Inspectors are expected to request the assistance of these specialists when evaluating proposals to conduct operations outside controlled airspace.

217. OPERATIONS IN SENSITIVE INTERNATIONAL AREAS. Operations by U.S. operators within the sovereign airspace of certain countries have high international sensitivity. Operations within these countries are usually restricted by international agreements. These agreements frequently specify certain airports, selected routes and special procedures which must be used. Except when specifically approved by AFS-200, inspectors shall not authorize operations within the areas or countries specified in this paragraph. When a request to operate in a sensitive area is received from an operator, inspectors shall forward the request through regional flight standards division (RFSD) to AFS-200. AFS-200 shall coordinate the request with AIA-100. If the request is approved, direction and guidance will be provided to the responsible inspector. The inspector shall approve the operation by adding the area of en route operation to paragraph B50 of the standard operations specifications. After approval, the responsible inspectors shall determine that the operator complies with the direction and guidance provided by AFS-200 and AIA-100. The following areas and/or countries are considered to be sensitive areas:

- Afghanistan
- Angola
- Armenia
- Azerbaijan
- Bosnia - Herzegovina
- Georgia
- Havana FIR/UIR
- Iran
- Iraq
- Lebanon
- Libya
- Nigeria (Lagos' Murtala Muhammad Airport)

- North Korea
- Serbia - Montenegro
- Somalia

219. SOUTH ATLANTIC AND GULF OF MEXICO CONTROL AREAS (ATLANTIC AND GULF ROUTES).

A. Atlantic routes (AR) and gulf routes are special case routes in which Class II navigation can be conducted using VOR/DME and NDB supplemented by dead reckoning. These routes are located off-shore in the South Atlantic control area and Gulf of Mexico control areas as shown on en route charts. These areas are established by FAA Handbook 7400.2C, "Procedures for Handling Airspace Matters" to serve aircraft operations between U.S. territorial limits and oceanic control area/flight information region boundaries and/or domestic flights which operate in part over the high seas. These transition control areas permit the application of domestic procedures and separation minimums by air traffic control services.

B. Because independent radar surveillance is maintained while operating within these control areas, separation minimums are not as large as those in oceanic control areas. As long as radar surveillance is maintained, operations may be conducted on AR and Gulf Routes using VOR/DME and NDB supplemented by dead reckoning. The special provision of radar surveillance provides the equivalent level of safety for aircraft separation even through dead reckoning may be required for relatively long periods of time (approximately 45-50 minutes). In addition, due to the proximity of these routes to shore-based facilities, the accuracy of dead reckoning can be enhanced by using position fixing information from shore-based VOR/DME NAVAID's. Dead reckoning techniques and procedures must be included in the FAA-approved training program for operation on these routes. It should include contingency training for diversions such as weather avoidance or emergencies (see paragraphs 121a and 123).

C. Approval of the use of ICAO standard NAVAID's supplemented by dead reckoning in the South Atlantic and Gulf of Mexico control areas is granted by entering these areas in paragraph B50 of the operations specifications.

221. SPECIAL AREAS WHERE REDUNDANT LONG-RANGE NAVIGATION SYSTEMS ARE USUALLY NOT REQUIRED. Certain special areas have been identified where long-range navigation can be conducted with a single long-range navigation system.

A. *Concept.* The provisions of the Federal Aviation Regulations (FAR) related to Class II navigation do not specifically require redundant or dual long-range navigation systems. The primary Class II navigation requirements are related to the level of navigational performance necessary for the control of air traffic. The objective of requirements for redundant navigational systems is to permit the flight to continue to navigate to the degree of accuracy necessary for the control of air traffic in the event a failure occurs in the navigational system being used.

(1) In certain situations, Class II navigation can be safely conducted using ICAO standard NAVAID's supplemented by dead reckoning (see section 4). Operations can also be safely conducted in much larger areas using a combination of redundant ICAO standard NAVAID's and a single, long-range navigation system. The basic concept for these operations considers the availability of ICAO standard NAVAID's, the lateral separation minimums applied by ATC (the navigational performance required), the length of the route or route segment, the complexity of the route structure, and the density of the air traffic.

(2) When the long-range navigation segment of the route flown is relatively short (several hours), the ATC lateral separation minimums are large (usually 90 NM or more), and the upper air winds are relatively stable, single long-range navigation systems may be adequate. The primary concern related to the use of single long-range navigation systems is preserving the ability to navigate to the degree of accuracy required for the control of air traffic following a failure in the long-range navigation system. Historically, the required navigational performance (following such failures) has been provided by the use of dead reckoning and ICAO standard NAVAID's. Since dead reckoning is much less accurate than using a long-range navigation system, the period of time that dead reckoning must be used is the most critical factor. Operational experience and analysis has shown that turbojet operations can be safely conducted (within special areas described in this paragraph) with an approved, single long-range navigation system and the redundant means of using ICAO standard NAVAID's.

B. *Special Provisions for the Western Atlantic Ocean, Caribbean Sea, and Gulf of Mexico.* The unique nature of the Western Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico permits operations with turbine-powered airplanes and certain offshore helicopter operations to be safely conducted with a single approved long-range system. Approval of the use of a single long-range navigation system is granted by entering a note in the limitations, provisions, and reference paragraphs column of paragraph

B50 of the operations specifications. The note should indicate that a single system (specify the system make) is authorized. The areas of operation where these operations may be authorized in paragraph B50 of the operations specifications are as follows:

- The Gulf of Mexico
- The Caribbean Sea
- The North Atlantic Ocean west of the western boundary of NAT/MNPS airspace and west of a line from 27 degrees N/60W to 10 degrees N/ 55W

C. *Special Provisions for Certain Routes in NAT/ MNPS Airspace.* Special contingency routes have been established in limited portions of NAT/MNPS airspace where aircraft equipped to use standard ICAO NAVAID's can operate with a single long-range navigation system. These routes are specified in the International Flight Information Manual (IFIM). Operations over these routes can be authorized provided the operator shows that the long-range navigation system/aircraft combination used and the operational procedures used meets NAT/MNPS requirements (AC 120-33). The approval is granted in accordance with paragraph B39(d) of the operations specifications and by adding that area of en route operation to paragraph B50 of the standard operations specifications.

D. *Other Special Areas.* Inspectors shall not authorize operations with single long-range navigation systems in any other areas of operation without the review and concurrence of AFS-200. When a request to operate with single long-range navigation systems in areas not described in this paragraph is received, inspectors shall request assistance from one of the agency's navigation specialists. If the responsible inspector and the navigation specialist determine that the proposed operation can be safely conducted, a request for review and concurrence should be forwarded, through regional office, to AFS-200. AFS-200 will provide national direction and guidance for evaluating and approving or denying the proposed operation.

223. AIR TRANSPORTATION OPERATIONS WITHIN THE FORMER SOVIET UNION.

A. *General.* As a result of the new bilateral air transportation agreement between the U.S. and the Russian Federation, a significant increase in air transportation between the two countries is expected. Due to the short distance between the state of Alaska and the C.I.S., significant increases in air traffic are expected in the far eastern portion of this region. This area, traditionally called the Soviet Far East (SFE), is now known as the Russian Far East (RFE). This section contains specific guidance to be used by principal operations inspectors (POI) who have been asked to approve operations by U.S. air carriers within the C.I.S. Prior to beginning such approval, coordination with AFS-500 is required.

(1) *Overview of Regional Differences in the C.I.S.* The C.I.S. is more than twice the size of the U.S. and is significantly more diverse in aviation infrastructure. Flight operations within the western part of the country (generally west of the Ural mountains) are considerably less challenging than flights in the eastern part of the country. In the east, primarily due to limited facilities, sparse population, and harsh winter weather, routine flight planning may be difficult. Communications, navigation, and airport availability require special emphasis before the initiation of flights within this region. Operating aircraft in the western C.I.S. is generally less demanding; however, many significant operational differences exist.

(2) *Overview of Airport and Airway Differences Within the C.I.S.* The airports and airways in the C.I.S. are divided into two categories: international and domestic.

(a) *International Airports and Airways.* International routes and airports in the C.I.S. are generally available for use by foreign aircraft operators, provided the operators have received appropriate flight authorizations from C.I.S. and FAA authorities. These routes and airports are published in the Russian AIP. ATC communications are provided in English, and airports have customs and immigration services as well as fuel (AVGAS availability is limited). Instrument approach procedures are generally available in ICAO format and are similar to approach procedures used worldwide.

(b) *Domestic Airports and Airways.* Domestic airports and routes in the C.I.S. are generally not usable by foreign aircraft operators unless a Russian navigator is utilized to communicate with ATC and provide instructions to the flightcrew regarding navigation principles and procedures. En route and terminal air traffic control within the domestic systems are accomplished in the Russian language since a large percentage of C.I.S. air traffic controllers do not speak English. En route charts and instrument approach procedures for the domestic system are not published in English, are generally not available to foreign aircraft operators, and may not meet ICAO requirements. Weather and notice To airmen (NOTAM) information will be difficult or impossible to obtain and will not be provided in English or in standard format.

(3) *General Navigational Considerations.*

(a) The conduct of navigation off established airways in the C.I.S. is generally not permissible; therefore, foreign aircraft operations are restricted to published international routes and airports, even for refueling stops and alternate airports. Appropriate flight crewmember training on metric conversion and the availability in flight of conversion charts are necessary to enable crewmembers to convert metric altitudes, weights, and windspeeds. Although operators are permitted to conduct flights to or within the C.I.S. under visual flight rules (VFR), there are significant C.I.S. flight rule differences that normally preclude foreign aircraft operators from conducting flights under VFR.

(b) In some areas, ATC procedures have been developed that allow operations off published routings by using radar vectors. If clearance is received to operate off airways, the carrier is authorized to accept the clearance. However, due to military concerns, it is possible that the radar vectors received may not be most expeditious for the carrier.

B. *Areas of Consideration.* When reviewing an operator's proposal for operations within the C.I.S., Pious should review the following:

(1) *Russian AIP.* This is the primary document available concerning foreign aircraft operations within the C.I.S. The Russian AIP is published by the Aeronautical Information Service (AIS), which is part of the Department of Air Transport (DAT) of the C.I.S. It is published in both Russian and English and contains detailed flight operational requirements as well as terminal, airport, and instrument approach charts in ICAO format. It is available from the AIS on an annual subscription basis, including monthly revisions. Subscription service or further information may be obtained from the following address:

Aeronautical Information Service
Department of Air Transport
67 Svoboda Street
Moscow, Russia
Telephone 492-82-85
AFTN: UUUUYOYX
Telex: 411182, AIS

NOTE: The navigation charts and standard instrument approach procedures (SIAP) for the C.I.S. domestic system are not included in the AIP and are usually not available in English.

(2) *Communications.* POI's should be aware that communications to, from, and within the C.I.S. can be difficult. Some specific areas of communication that POI's should consider include the following:

(a) *ATC Communications.* The ATC communication system within the C.I.S. is generally good. VHF is commonly used for en route communications, but HF is required for certain routes. The communication equipment requirements are listed in the Russian AIP. POI's are encouraged to evaluate all routes used by their assigned air carriers to ensure the adequacy of communications. Unlike U.S. controllers, C.I.S. air traffic controllers have limited access to weather and NOTAM information.

(b) *Aeronautical Fixed Telecommunications Network (AFTN) or Society Internationale de Telecommunications Aeronautique (SITA) Networks.* Data transmission and reception is accomplished by using the AFTN or SITA networks, although in remote areas only AFTN may be available. Transmitting or receiving messages by using the AFTN system within the C.I.S. (to and from many remote areas, especially in the RFE) may be less timely than desirable. This is because most messages enter and depart the C.I.S. in Moscow, and manual manipulation of messages is required at many transfer stations before and after reaching Moscow. Also, the existing telecommunications infrastructure is not reliable. No error checking is done; for example, if, because of a formatting error or for some other reason, a message is rejected en route, no one checks on this; the message is just dumped.

(c) *Telephone Service.* Telephone service to, from, and within the C.I.S. is limited. Various systems are used, including an HF troposcatter system which, due to technical limitations, makes communication extremely difficult. Establishing necessary reliable communications to and from line stations within the C.I.S. may be more difficult than in other areas.

(3) *Navigation.* It is permissible to conduct navigation on international routes within the C.I.S. by utilizing Class I or Class II navigation systems. Route widths vary from 8 km to 20 km, as indicated in the Russian AIP. It is the pilot's responsibility to keep the aircraft within established airway boundaries. Available altitudes also vary from one route to another as identified in the Russian AIP. When planning flights, operators must ensure that the desired altitudes are available for particular routes. This is especially important in the RFE where there is usually only one route available for flights. In the RFE, Class I en route navigation on international routes is primarily accomplished by utilizing NDB's); however, numerous compatible VOR transmitters will be installed in the coming years. In the western C.I.S., compatible VOR transmitters are also utilized to define international routes. In certain situations, especially in the RFE,

it may be necessary to require operators to utilize Class II navigation to supplement Class I navigation due to the distance between NAVAID's and the limited width of airways. Class II en route navigation on international routes should be relatively simple, provided two conditions are properly addressed. The first condition is that, depending on the published route widths, length of flight, and type of Class II navigation equipment utilized, it may not be possible for an operator to maintain the course centerline accuracy required by the C.I.S. Limitations on the operation of some VLF/Omega systems, as shown in the flight manual supplement of the AFM, may preclude their use in some areas of the C.I.S. The second condition concerns the lack of VOR/DME transmitters, especially in the RFE, which means that special consideration must be given by operators to navigation accuracy requirements when utilizing inertial reference systems (IRS), such as B-757, B-767, and A-310. Again, it may not be possible to obtain the required navigation accuracy unless, considering the specific route and length of flight, VOR/DME updates are provided to the IRS. Other areas concerning navigation that POI's must consider when evaluating operator requests include the following:

(a) *Alternate Airports.* For flight planning purposes, operators must give careful consideration to the location of, and routing to, suitable alternate airports. Fuel planning must be carefully considered due to potential difficulties with communications, diversion airport routings, and the lack of suitable airports.

(b) *Extended Range Operation With Two-Engine Airplanes (ETOPS).* Operations in certain areas with two-engine aircraft may require ETOPS approval due to the lack of adequate/suitable airports within 60 minutes of the operator's route. AC 120-42, "Extended Range Operation With Two-Engine Airplanes (ETOPS)," as amended, contains additional information.

(c) *C.I.S. Navigator Assistance.* The conduct of navigation within the C.I.S. is the responsibility of the PIC. Flights operating off of established international routes, or on the domestic route system, usually will not be permitted by the C.I.S. unless a C.I.S. navigator is aboard. In unique situations, a radio operator will also be required; however, these two functions are usually performed by the navigator. The assistance of a navigator will also be required for flights to or from any C.I.S. domestic airport. Although the navigator may be required by the C.I.S., the navigator is not a required flight crewmember according to the FAR and is not responsible for the conduct of the flight. The purpose of the navigator is to provide assistance in cross-checking course guidance information en route and to provide assistance in cross-checking information on terminal arrivals and departures, as well as instrument approach procedures (IAP). Due to jumpseat management considerations, POI's and operators should consider carefully any requests to carry C.I.S. navigators/radio operators. POI's shall obtain the concurrence of AFS-200 before approving an operator's carriage of these persons. When evaluating C.I.S. navigator/radio operator requirements, inspectors and operators should consider the following information:

1. Due to the lack of informational and technical data pertaining to operations in the C.I.S. domestic system, which are needed to meet requirements of FAR Parts 121 and 135, it may not be possible for operators to conduct operations at most domestic airports at this time.

2. C.I.S. navigators are required to use a cockpit jumpseat, which may preclude an FAA inspector from accomplishing a required en route inspection or validation test on a particular flight or series of flights.

3. The charts for the domestic system are usually not available in English.

4. The Russian DAT charges a substantial fee for the use of navigators.

(d) *Area of Magnetic Unreliability.* Depending on the latitude of the routes flown, operations may be conducted within the C.I.S. area of magnetic unreliability. Procedures for approving flights within an area of magnetic unreliability can be found in volume 3, paragraph 139; and in volume 4, paragraph 151.

(e) *Approval of VFR-only Flights for FAR Part 135 Operators.* Due to complex VFR flight requirements (as identified in the Russian AIP) and requirements that aircraft operate on established airways at assigned altitudes, the approval of VFR-only flights by FAR Part 135 air carriers is not recommended. Deviations around clouds under C.I.S. flight rules will be difficult or impossible to achieve due to the rigidity of the C.I.S. airspace requirements to maintain airway altitude and airway centerline. Approval of FAR Part 135 VFR-Only air carrier operations within the C.I.S. shall be coordinated with AFS-200.

(4) *Terminal IAP's.* Terminal IAP's at international airports within the C.I.S. are conventional and should not be confusing to foreign operators. Arrival and departure procedures are similar to U.S. standard terminal arrival routes (STAR) and standard

instrument departures (SID). Radar vectoring is uncommon; therefore, flight crewmembers should expect to fly full procedures as published in the AIP or Jeppesen charts. Flight crewmembers should be aware that use of QFE (atmospheric pressure at airport elevation) is common, and transition levels vary from one sector to another. IAP's are standard (instrument landing system (ILS), VOR, NDB). Precision radar approaches (PAR) are also very common throughout the C.I.S.; however, it is recommended that POI's exercise caution when approving requests by air carriers to conduct PAR's within the C.I.S., due to the lack of English language proficiency by most local air traffic controllers. POI's whose operators wish to conduct PAR's within the C.I.S. should approve these operations on an airport-by-airport basis. AFS-500 should be consulted for information as to current problems and policies. Terminal IAP's at domestic airports are usually neither published in English nor readily available to foreign air carriers. Therefore, POI's must ensure that their operators have obtained and demonstrated the adequacy of the data and meet the applicable portions of appropriate FAR concerning routes, airports, weather, and communication. C.I.S. navigators, who are required for foreign aircraft operators within the domestic system, will carry en route, terminal area, and instrument approach charts for their use within the domestic system. These charts are generally available in Russian language only. During all operations, the flightcrew shall utilize only publications that have been translated into English. These may be obtained from commercial sources. Class II navigation capability will likely be required for operators navigating within the domestic system, due to the inability of foreign aircraft to receive signals from the C.I.S. VHF RSBN (short-range navigation system). Many NAVAID's (VHF RSBN and NDB) within the domestic system use identifiers that do not have an English translation. POI's must reference FAA Order 8260.31, "Foreign Terminal Instrument Procedures," for guidance and approval criteria to ensure that established safety standards are met.

(5) *Air Carrier Training Programs.* Revisions to air carrier training programs and/or international procedures training for flight crewmembers may be required prior to issuing operations specifications. POI's should ensure that appropriate information contained in the Russian AIP is incorporated into air carrier training programs. For further guidance on training programs, refer to volume 3, chapter 2.

(6) *Flight Approval.* According to both the Russian AIP and the IFIM, an operator must receive written approval from DAT-Moscow before initiating a flight that will enter C.I.S. airspace. Operators shall not request flight approval through any regional ministry or Aeroflot office. Any approval granted by a regional office should not be considered sufficient unless accompanied by approval from DAT-Moscow. Aircraft operators intending to utilize standard air corridors and international airports in the C.I.S. should submit their request, via telex, directly to the DAT, far enough in advance so as to reach the ministry at least 5 working days (3 weeks is suggested) before departure. The telegraphic address is as follows:

International Department
Department of Air Transport
Leningradsky Prospect 37
Moscow, Russia
Telex: 411182 AFL SU

It is recommended that a simultaneous request be made to the Central Department of Operational Services (CDOS). The telegraphic address is as follows:

Central Department of Operational Services
Telex: 412303 CDS SU
AFTN: UUUUYAYW
SITA: MOWZGSU

Operator requests for aircraft using nonstandard routings and/or intending to land at airports normally serving domestic traffic should be submitted through the Economic Section of the U.S. Embassy in Moscow, APO, NY, 09862. The telegraphic address is as follows:

Amembassy Moscow
Telex: 413160 USGSO SU

Information to be included in Telex is listed in the AIP and IFIM. Recent operator experience indicates that the communication infrastructure may preclude receiving this authority in a timely manner. Personal presentations, to include objectives and justification, may be more effective.

(7) *Validation Test Requirements.* These are required for all U.S. operators seeking approval to operate within C.I.S. airspace. Guidance for validation tests is contained in volume 3, chapter 9.

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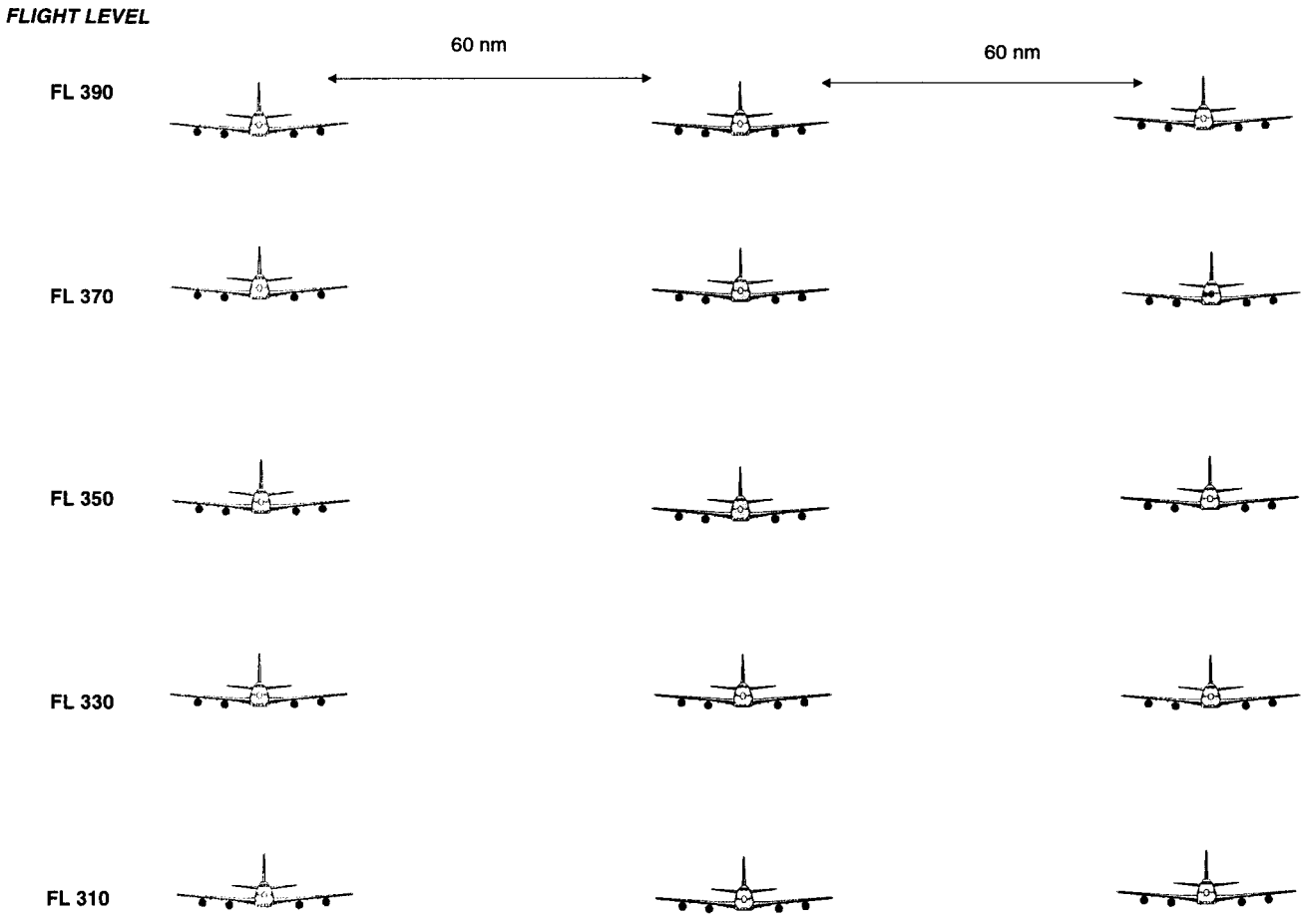
FIGURE 4.1.5.1
ILLUSTRATION OF NORTH ATLANTIC (NAT/MNPS) RECTANGULAR SEPARATION



NORTH ATLANTIC MNPS SEPARATION STANDARDS. Aircraft are separated by one of the following methods:

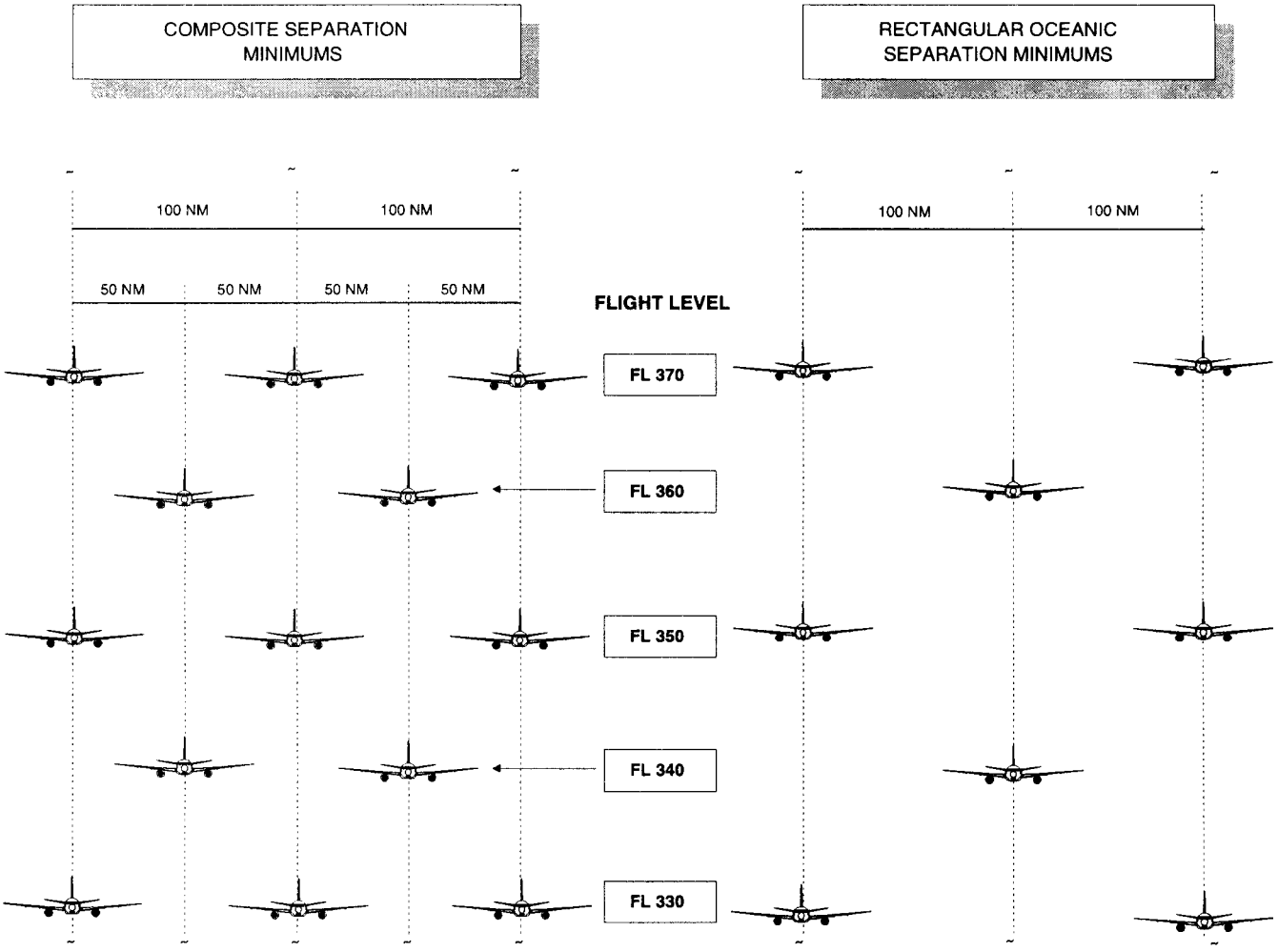
A. Lateral Separation. Lateral separation between co-altitude aircraft (aircraft at the same flight level) is 60 nm.

B. Vertical Separation. Vertical separation between aircraft on the same track is 2,000 feet.

C. Longitudinal Separation. Basic longitudinal separation between aircraft on the same track is 10 minutes. If an aircraft is flying faster than the aircraft behind it (mach advantage), than this criteria may be reduced.

NOTE: Separation standards may be changed. Consult Regional Supplementary Procedures (ICAO Document 7030/3) for current standards applied in the NAT Region

FIGURE 4.1.5.2
ILLUSTRATION OF COMPARISON
BETWEEN
COMPOSITE SEPARATION MINIMUMS
AND
RECTANGULAR OCEANIC SEPARATION MINIMUMS



Separation standards establish separation between aircraft by either:

1. Vertical separation of 2000 ft. (above flight level 290) between aircraft on the same route.

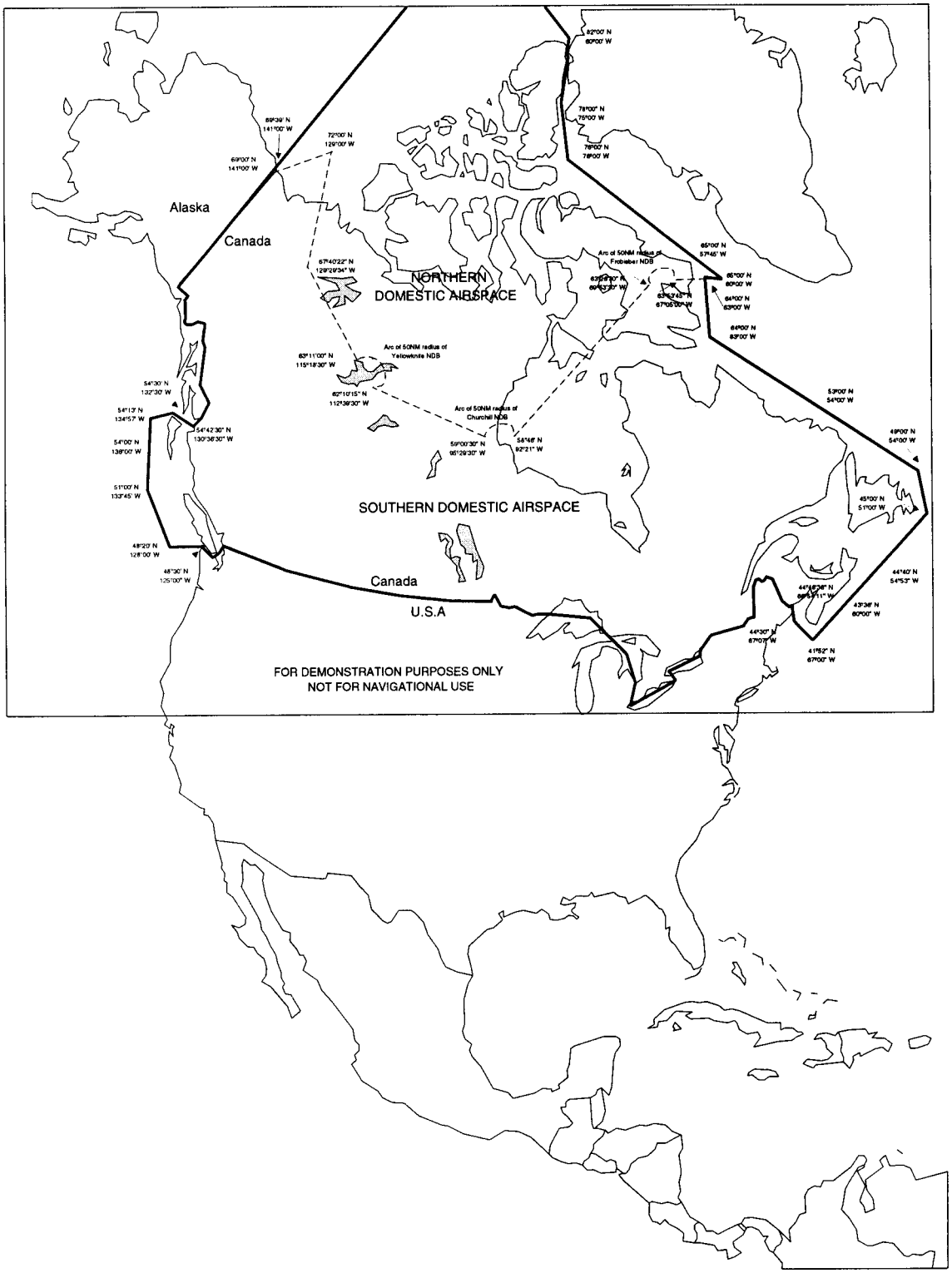
2. A lateral separation of 100 nm between aircraft at the same altitude on adjacent routes.

3. A longitudinal separation of 15 minutes between aircraft on the same route at the same altitude.

4. A composite separation of 50 nm laterally and 1000 ft. vertically between aircraft or adjacent routes.

NOTE: Separation minimum vary between ICAO regions. Consult the Regional Supplementary Procedures (ICAO Document 7030/3) for current standards applied in each region.

FIGURE 4.1.5.3
CANADIAN DOMESTIC AIRSPACE



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